Abstracts

Predicted Performance of Semiconductor Junction Circulators with Losses

L.E. Davis and R. Sloan. "Predicted Performance of Semiconductor Junction Circulators with Losses." 1993 Transactions on Microwave Theory and Techniques 41.11 (Dec. 1993 [T-MTT] (1993 Symposium Issue)): 2243-2247.

A study of the circulation properties of a gyroelectric medium consisting of a high-quality n-type semiconductor is given. Losses due to electron collisions are modeled by inclusion of the collision frequency v/sub c/ in the relative permittivity tensor. Broadband low-loss operation of a semiconductor slotline junction circulator above the extraordinary wave resonance frequency f/sub res/ appears possible at near-millimetric frequencies. Larger, applied static magnetic fields enable narrowband lowloss operation at frequencies below the resonance at f/sub res/. A 40 GHz design is described for GaAs cooled to 77 K. The minimum inband insertion loss is 0.82 dB. InSb theoretically possesses still lower losses for a reduced applied magnetic field. An example at an operating frequency of 75 GHz in InSb is given.

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